Total No. of Questions—12]   [Total No. of Printed Pages—4+1

S.E. (Electrical) (I Sem.) EXAMINATION, 2011

POWER PLANT ENGINEERING

(2008 PATTERN)

Time : Three Hours   **Maximum Marks : 100**

N.B. **:—**   (*i*)   Answer any *three* questions from Section I and any *three*

questions from Section II.

(*ii*)   Answers to the two Sections should be written in separate

answer-books.

(*iii*)   Figures to the right indicate full marks.

(*iv*)   Assume suitable data, if necessary.

SECTION I

UNIT I

1.   (*a*)   Explain with neat sketch working of a Boy's gas

calorimeter.   [8]

(*b*)   Explain with neat sketch working of a pulverised bed combustion

system.   [8]

Or

2.   A steam power plant works on a Rankine cycle. The steam at inlet

to the turbine is saturated at a pressure of 35 bar and is exhausted

into the condenser at a pressure of 0.30 bar. Consider the pump work. Determine :

(1)   Pump work

(2)   Turbine work

(3)   Net work done

(4)   Dryness fraction of the steam entering into the condenser

(5)   Specific steam consumption

(6)   Work Ratio

(7)   Rankine cycle efficiency.   [16]

UNIT II

3.   (*a*)   Compare Carnot cycle with Rankine cycle.   [4]

    (*b*)   Classify boilers.   [4]

    (*c*)   Explain with neat sketch "Boiler draught systems".   [8]

Or

4.   (*a*)   What are the factors considered for selection of a site for thermal power plant ?   [4]

    (*b*)   Explain with neat sketch working of an "Electrostatic precipitator."   [6]

    (*c*)   Write a short note on "Feed water treatment" for the thermal power plant.   [6]

UNIT III

5. (*a*) Classify Hydroelectric power plants. [6]

(*b*) Write a short note on "Draft tube and its types". [6]

(*c*) Explain with neat sketch "Centrifugal Governing Mechanism". [6]

Or

6. (*a*) What are the points considered for site selection for Hydro-electric Power Plant ? [6]

(*b*) Explain with neat sketch the working of a "Francis Turbine". [6]

(*c*) Write a short note on "Hydroelectric Power Plant Development Programme of India". [6]

SECTION II

UNIT IV

7. (*a*) Explain with neat sketch the working of "CANDU" Nuclear Reactor. [8]

(*b*) Explain with neat sketch the working of Diesel engine power plant. [8]

Or

8. (*a*) Explain with neat sketch the working of "Boiling Water Reactor" (B.W.R.). [8]

(*b*) Write applications, advantages and disadvantages of Diesel engine power plant. [8]

UNIT V

9. (*a*) Explain with neat sketch the working of "Closed cycle Gas Turbine power plant". [8]

(*b*) Explain with neat sketch the working of "Open cycle Magneto Hydrodynamic (MHD) system". [8]

Or

10. (*a*) Write a short note on Gas turbine fuels and Gas turbine materials. [8]

(*b*) Explain with neat sketch "Wind Electric Generation System". [8]

UNIT VI

11. (*a*) Discuss the various fixed charges and running charges which are used for calculation of cost of electrical energy. [8]

(*b*) The following data is obtained for a 3000 kW diesel engine power plant. The peak load on the plant is 1800 kW and its load factor is 52%.

Capital Cost per kW installed = Rs. 2,000

Annual Cost = 20% of capital

Annual Operating Cost = Rs. 80,000

Fuel Cost = Rs. 8 per kg

Cost of lubricating oil = Rs. 90 per kg

Fuel consumed = 0.35 kg/kW-hr

Lubricating oil used = 0.030 kg/kW-hr

Determine :

(1)   Annual energy generated

(2)   Cost of power generation in Rs. per kW/hr.   [10]

Or

12.   (*a*)   Define the following :

(1)   Demand factor

(2)   Load factor

(3)   Plant capacity factor

(4)   Plant use factor

(5)   Diversity factor.   [10]

(*b*)   The maximum load on a thermal power plant of 80 MW capacity is 60 MW at annual load factor of 65%. The coal consumption is 0.90 kg per unit of energy generated and cost of fuel (coal) is Rs. 3 per kg. Find the annual revenue earned, if the electric energy is sold at Rs. 3.5 per kW/hr.   [8]